

CLAIMS

1. An IR dryer, for use in drying a continuous paper web by means of IR radiation, comprising
5 an array of IR emitters arranged, in use, in spaced relation to the paper web;
a lamp protection plate intermediate the IR emitters and the paper web,
characterised in that at least one of the lamp
10 protection plate and the array of IR emitters is curved whereby drying a paper web which moves in a curved path is facilitated.
2. An IR dryer as claimed in claim 1 wherein each of
15 said IR emitters is a lamp comprising a heating element located within a curved quartz tube.
3. An IR dryer as claimed in claim 1 wherein each of
20 said IR emitters is gas-powered.
4. An IR dryer as claimed in any of the preceding claims wherein said lamp protection plate comprises
an array of curved quartz tubes.
- 25 5. An IR dryer as claimed in claim 4 wherein said lamp protection plate is cooled, in use, by the passage of gas, for example air, through said curved quartz tubes.
- 30 6. An IR dryer as claimed in any of the preceding claims further comprising a curved reflector plate.
7. An IR dryer, for use in drying a continuous paper web by means of IR radiation, comprising
35 an array of IR emitters arranged, in use, in

spaced relation to the paper web;
a lamp protection plate intermediate the IR
emitters and the paper web,
characterised in that the lamp protection plate
5 comprises a plurality of quartz tubes arranged in an
array.

8. An IR dryer as claimed in claim 7 wherein the lamp
protection plate is cooled in use, by the passage of
10 gas, for example air, through said quartz tubes.

9. An IR dryer as claimed in claim 7 or claim 8 wherein
said IR emitters are lamps, each comprising a quartz
tube, substantially identical to those used in the
15 lamp protection plate, in which is located an IR
heating element.

10. An IR dryer as claimed in any of claims 7-9 wherein
said quartz tubes are curved.
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11. A method of bending an elongate quartz tube
comprising the steps of
supporting the tube in a substantially vertical
orientation;
25 gripping the tube near its uppermost end;
heating the tube at region intermediate its
lowermost end and the uppermost end; and
moving the gripped uppermost end of the tube so
that the tube, softened in the vicinity of the
30 heating region, is bent.

12. A method as claimed in claim 11 wherein the gripped
uppermost end of the tube is moved in an arc.

35 13. A method as claimed in claim 11 or claim 12 wherein

the tube is counterbalanced.

14. A method as claimed in any of claims 11-13 wherein the lowermost end of the tube is constrained to move in a substantially vertical path.

15. Apparatus for bending an elongate quartz tube comprising

support means for supporting the tube in a substantially vertical orientation;

gripping means for gripping the tube near its uppermost end;

heating means situated at region intermediate the lowermost end and the uppermost end of the tube;

and driving means for moving the gripped uppermost end of the tube, in use, so that the tube, softened in the vicinity of the heating means, is bent.

16. Apparatus as claimed in claim 15 wherein the heating means substantially surrounds the tube, in use.

17. Apparatus as claimed in claim 15 or claim 16 wherein the heating means comprises a plurality of gas burners.

18. Apparatus as claimed in claim 17 when dependent on claim 16 wherein the plurality of gas burners comprises a ring of gas burners, in the centre of which the tube is situated, in use.

19. Apparatus as claimed in any of claims 15-18 further comprising barrier means which has a curved surface against which the tube may abut, in use, so as to prevent lateral movement of the tube.

20. Apparatus as claimed in claim 19 wherein the barrier means comprises a wheel.
- 5 21. Apparatus as claimed in claim 20 wherein the wheel is removeable and replaceable with a wheel of different diameter.
- 10 22. Apparatus as claimed in any of claims 15-21 further comprising a counter-balance arrangement by means of which the lowermost end of the tube can be constrained in use, to follow a substantially vertical path.
- 15 23. Apparatus as claimed in any of claims 15-22 wherein said driving means comprises a pivotable arm, at one end of which is situated said gripping means, the arm being pivotable, in use, so that the gripping means generally describes an arc.
- 20 24. Apparatus as claimed in claim 23 wherein the pivot point of said pivotable arm is, in use, substantially horizontally level with a desired region of bending of the tube.
- 25 25. Apparatus as claimed in claim 23 or 24 wherein said pivotable arm is driven by a motor.
- 30 26. Apparatus as claimed in any of claims 15-25 wherein said gripping means is water-cooled.
27. A curved quartz tube manufactured using the apparatus and/or method of any of claims 11-26.
- 35 28. A curved quartz tube as claimed in claim 27 in which

is located an infra red (IR) heating element.

29. An IR dryer for use in the papermaking industry including an array of curved lamps, each of which
5 lamps comprises a heating element located within a curved quartz tube as claimed in claim 28.

30. An IR dryer as claimed in claim 29 including a curved reflector plate.

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31. An IR dryer for use in the papermaking industry including a curved lamp protection plate which comprises an array of curved quartz tubes as claimed in claim 27.

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